

68

# —TEA—

AND THE

## EFFECTS OF TEA DRINKING.



BY

W. SCOTT TEBB, M.A., M.D., CANTAB., D.P.H.

FELLOW OF THE INSTITUTE OF CHEMISTRY, PUBLIC ANALYST TO THE  
METROPOLITAN BOROUGH OF SOUTHWARK.

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In March, 1904, the Southwark Borough Council at the request of Sir William Collins gave permission for an inquiry to be made into the constituents of tea in order to ascertain what injurious ingredients were present, and if it were possible to obtain the characteristic effects without subjecting tea-drinkers to any of the deleterious symptoms. The subject will be seen to be of importance and I propose to include a brief history of the use of the Tea plant, together with a general review of the experience gained by those best competent to judge of the effects since its introduction of what has now come to be considered a necessity of life. In addition there are set forth the results of examination of different samples of tea and the general conclusions to which I have arrived.

What we call tea, is called by the Chinese tcha, tha, or te, and by the Russians tchai. The original English word was tee, at least this is the name used by Samuel Pepys one of the earliest to allude to the herb in this country. Tee was afterwards altered to tay, as will be seen from Pope's lines in the "Rape of the Lock."

Soft yielding minds to water glide away  
And sip, with nymphs, their elemental tay.

Or again,

Hear thou, great Anna ! whom three realms obey  
. Dost sometimes counsel take, and sometimes tay.

Some of the modern editions of Pope have altered the spelling at the expense of the rhyme.

The tea-plant, *Thea Sinensis*, botanically speaking a close ally of the *Camellia* is in its natural state a tree which attains to 20 or 30 feet in height. Under cultivation it remains a shrub from three to six feet high. It grows in all tropical and sub-tropical countries, and roughly it takes the labour of one man a day to produce a pound of tea. The leaves—the only part of the plant used in commerce—vary from two to six inches long, are evergreen, lanceolate and serrated throughout nearly the whole margin ; the leaves are stalked and arranged alternately on axis, the flowers somewhat resemble apple blossoms but are smaller.

The shrubs are planted in rows three or four feet apart and look like a field of currant or gooseberry bushes ; at the end of the third year the bushes become large enough to allow of the first picking and in the eighth year the plant is cut down, when new shoots spring up from the old roots. In Ceylon and parts of India the first picking is in March and there may be as many as 25 pickings in the season until October ; in China the first picking is in April, and in Japan late in April or early May. The early pickings make the finest quality of tea, and the very late leaves are not usually exported at all, but are used by the peasants locally. In preparation for commerce the leaves are subjected to various processes of drying, rolling and roasting, into which it would not be necessary at any length to enter ; the essential point to remember is that black tea differs from green in that after a short preliminary rolling and roasting, the leaves are exposed to the air in a soft moist state, when they undergo fermentation with the result it is said that a portion of the tannic acid is converted to sugar. Robert Fortune,\* an authority on the cultivation of the tea plant thought that the differences of manufacture “ fully account for the difference in colour, as well as for the effect produced on some constitutions by green tea, such as nervous irritability, sleeplessness, &c.”

When we come to look into the early origin of the practice of tea-drinking we find that the subject is shrouded in the mists of antiquity. There are many legendary stories of the discovery and use of tea by the Chinese, but the only authentic and well-attested accounts were given by two Mahomedans who travelled in India and China in the ninth

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\* A journey to the Tea Countries of China, p. 281, London 1852.

century. The original manuscript was found in the Comte de Seignelay's library by Eusebius Renaudot and published in 1733. There is plain internal evidence that the manuscript was written about 1173, for there are observations upon the extent and circumference of the walls and towers of Damascus and other cities in subjection to the Sultan Nuroddin, who is spoken of as living at that time. This prince died in 1173 which fixes the date of the narrative before that time. The account speaks of the Arab merchants having been present in China in the years 851 and 867 respectively. On page 25 occurs the following important passage "The Emperor also reserves to himself the revenues which arise from the salt mines and from a certain Herb which they drink with hot water, and of which great quantities are sold in all the cities, to the amount of great sums. They call it *sah* and it is a shrub more bushy than the pomegranate tree and of a more taking smell, but it has a kind of bitterness with it. Their way is to boil water, which they pour upon this leaf, and this drink cures all sorts of diseases; whatever sums are lodged in the treasury arise from the Poll-tax, and the duties upon salt, and upon this leaf."<sup>†</sup>

Tea was therefore much in vogue in China in the 9th century. From China the knowledge was carried to Japan, and there the cultivation was established at the beginning of the 13th century; from that time until the 19th century China and Japan have been the only two tea producing countries. As with all innovations Europe and particularly England was very slow to take to the practice, for tea is hardly mentioned by any of the writers prior to the 16th century.

One of the earliest to allude to the subject was Giovanni Botero\* in 1596, in his treatise on the causes of the magnificence and greatness of cities; he remarks that "they (the Chinese) have also an herb, out of which they press a delicate juice, which serves them for drink instead of wine, it also preserves their health and frees them from all those ills that the immoderate use of wine doth breed unto us."

It will be observed that in these early accounts much stress is laid on the beneficial action of tea in preserving health and curing disease, and this was in all probability the first use to which the shrub was applied. Thus one of the Sloane Manuscripts, dated 1686, gives a long list of "qualities and operations," attributed by the Chinese to the tea plant. It was said to purify the blood and kidneys, cure giddiness and pains in the head, vanquish superfluous sleep and heavy dreams, open obstruc-

<sup>†</sup> Ancient Accounts of India and China, by Eusebius Renaudot, London 1733.

\* *Delle cause della grandezza delle citta.* Giovanni Botero Milan 1596, p. 61.

tions, clear the sight, strengthen the memory, sharpen the wits and quicken the understanding.

About the year 1657, Thomas Garway of the Exchange Alley issued a sheet proclaiming the virtues of tea ; the alleged qualities being almost identical with those given in the Sloane Manuscript just mentioned. This was a sort of advertisement of his place of business and he tells us that "many noblemen, physitians, merchants, and gentlemen of quality" sent to town for the "said leaf," and "daily resort" to his house in Exchange Alley to drink tea. He informs us that prior to 1657 it was only used as a "regalia in high treatments and entertainments," and for presents for princes and grandees.

Another early reference is from an advertisement in the "Mercurius Politicus" for 1658. "That excellent, and by all physitians approved China drink, called by the *Chineans*, Tcha, by other nations *Tay alias Tee* is sold at the *Sultaness-head*, a *Cophee-house* in *Sweetings Rents*, by the Royal Exchange, London."\*

A further early reference is by Thomas Rugge† which may be seen in a manuscript at the British Museum. "About this time the parliament that was forced out the 13th day of October, 59 ; it was called by all sorts of persons the Rump, because they war soe few in number ; and there war also att this time a Turkish drink to be sould, almost in every street called Coffee, and another kind of drink called Tee, and also a drink called Chocolate which was a very harty drink."

It is rather difficult to reconcile this account of the prevalence of the use of tea as a drink with that of other writers of the period. Thus Pepys writing a year afterwards under date September 25, 1660, says : "I did send for a cup of tee (a China drink) of which I never had drank before." This clearly points to the novelty of the practice in 1660 for Samuel Pepys was Secretary of the Admiralty, and a public man of keen observation, and it is almost impossible if tea was commonly sold as a drink at this time that he should have been unaware of the fact. Macaulay‡ also mentions that about this time tea "had been handed round to be stared at." It seems therefore clear that the herb was quite recently introduced in 1660, and it is possible that Rugge under the name of "tee" is referring to hot infusions of other leaves for it is well

\* MERCURIUS POLITICUS, comprising the sum of Foreign intelligence with the affairs now on foot in the three nations of England, Scotland and Ireland. For information of the people. From Thursday, September 23rd to Thursday, September 30th, 1658. Number 435.

† MERCURIUS POLITICUS REDIVIVUS. A collection of most materiall occurances and transactions in publick affaires, A.D. 1659 to 1672. Add. M.S.S. 10116, p. 14.

‡ History of England, iv. 132.

known that herbs were commonly used for making different sorts of teas as sage tea, &c.\*

The first official notice of tea is in the Act of Parliament (12 Carolus II., c 23), by which a duty of eightpence was charged on every gallon of coffee, chocolate, sherbet, and tea made for sale. In 1662 Charles II. married Princess Catherine of Portugal, and the Poet Waller has immortalised tea-drinking by a birthday ode in her honour.

The muse's friend, tea, does our fancy aid,  
Repress those vapours which the head invade,  
And keeps that palace of the soul serene  
Fit, on her birthday, to salute the Queen.

Two years later the King was a recipient of the then valuable gift of 2lb. 2oz. of tea from the East India Company.

In Pepys Diary under the date of June 28, 1667, we read "Home and there find my wife making of tea; a drink which Mr. Pelling, the Potticary, tells her is good for her cold and defluxions." Tea, therefore, was just coming into vogue. In 1669 the East India Company received two canisters containing 143½ pounds; the price at this time was sixty shillings a pound. The Company imported 4713 pounds in 1678, but this amount probably glutted the market, for in the six subsequent years the imports were quite inconsiderable. In 1697-99 the imports averaged 20,000, in 1700-08 they reached 80,000 pounds, in 1728 over a million pounds, in 1754 four and a half million, in 1763 six million, and in 1779 nearly ten million pounds.† It is not necessary to follow the imports during the whole of the 18th century, speaking generally it was found that excessive duties led to smaller imports, and at the same time to a large increase of smuggling and other irregularities.

Since 1800 there has been an enormous increase of consumption in the United Kingdom, as will be seen from the following figures:—

\* Dried sage leaves were used for making infusions even up to the year 1750.

† See Report from Select Committee on Commercial Relations with China, 12th July, 1847, p. 501.

TABLE A.

Year-Periods.	Average number of pounds of Tea consumed per annum.	Average annual Population.	Average number of pounds of Tea consumed per head per annum.
1801-10	23,717,882	16,794,000	1.41
1811-20	24,753,808	19,316,700	1.28
1821-30	28,612,702	22,433,900	1.27
1831-40	34,441,766	25,257,200	1.36
1841-50	44,286,600	27,566,300	1.61
1851-60	65,160,456	28,172,400	2.31
1861-70	97,775,548	30,027,600	3.26
1871-80	144,462,622	33,055,020	4.37
1881-90	178,130,836	36,178,144	4.92
1891-1900	224,076,800	39,440,316	5.70
1901-03	255,270,472	41,550,773	6.10

Since the beginning of the last century therefore the average consumption per head has increased from 1.4 to 6.1 pounds. In our Australian and New Zealand Colonies the quantity consumed is even much larger than in the United Kingdom as will be seen from the table below:—

TABLE B.

	Average number of pounds of Tea consumed per head per annum.
New South Wales	8.01
Victoria	7.38
South Australia (except N. Territory)	8.87
South Australia (North Territory)	6.44
Western Australia	10.07
Queensland	7.09
Tasmania	6.62
All Australia	7.81
New Zealand	6.78

The enormous quantity of tea consumed in Great Britain and our Colonies will be better appreciated if comparisons are made with other Countries:—

TABLE C.

	Average number of pounds of Tea consumed per head per annum.
Russia	0.93
Germany	0.12
Holland	1.48
France	0.06
United States	1.09
Canada	4.64

I should like to say a few words concerning the sources of tea supply to the United Kingdom. Of course until fairly recent times practically all the tea came from China. Early in the last century it was found that the tea plant was indigenous to India. In 1825 the Society of Arts offered their gold medal "to the person who shall grow and prepare the greatest quantity of China tea, of good quality, not being less than 20 pounds weight" \* in the East Indies and British Colonies. In 1832 Dr. Wallick made a report on the cultivation of tea in India and said "that under a well-directed management the tea plant may at no distant period be made an object of extensive cultivation in the Honourable East India Company's Dominions." Several years afterwards in 1839 the Society of Arts Medal was awarded to Mr. C. A. Bruce "for discovering the indigenous tea tracts and successfully cultivating and preparing tea in the British possessions in India." In 1840 the first Indian Tea Company was formed, in 1853 tea was growing in Cachar, in 1856 in Sylhet, and in 1864 in Darjeeling and other places. Much more recently Ceylon has become prominent in supplying this country with tea. It came about in this way; the coffee plantations were destroyed by disease in 1868 and the planters succeeded in growing cinchona and tea as alternative crops. This experimental growth of tea in Ceylon has now become a flourishing industry.

The following table shows in five year periods since 1866, the proportion of each 100 pounds of tea imported into the United Kingdom from India, Ceylon, China and other countries respectively :

TABLE D.

Five Year Periods.	India.	Ceylon.	China.	Other Countries
1866-70	6.62	0.00	91.44	1.94
1871-75	10.50	0.08	85.62	3.80
1876-80	18.26	0.06	80.18	1.50
1881-85	26.73	0.85	70.71	1.71
1886-90	39.65	10.96	47.07	2.32
1891-95	47.10	29.30	21.04	2.56
1896-1900	50.25	36.30	10.52	2.93
1901-03	58.45	33.28	4.74	3.53

It appears that China which formerly supplied 90 per cent. in 1866, now contributes less than 5 per cent. of our tea. During the same period the Indian supply has gone up from 6 to 58 per cent., and Ceylon which only commenced to send tea in 1875 now sends the substantial proportion of 33 per cent. of the total importation.

\* See Article by Bannister in the Journal of the Society of Arts, October 31, 1890 p. 1030.

From the above tables it will be seen that of the yearly average of six pounds consumed in the United Kingdom, one third of a pound comes from China, three and a half pounds from India, and two pounds from Ceylon. The Dutch the next largest tea-drinkers to the British consume a pound and a half each person per annum, half of this comes from Java and the remaining half from the United Kingdom (principally of Chinese origin). Most of the tea drunk in Russia comes from China. In Australia two-thirds of the tea is imported from India and Ceylon, and the rest comes from China. In the United States more than half the tea comes from China and the bulk of the remainder from Japan.

I now proceed to deal briefly with the constituents of tea which are generally believed to impart to the tea infusion its special characters.

*Alkaloid.* The alkaloid which is present in tea to the extent of 3 or 4 per cent. is thought to be identical with that found in Coffee, viz: caffeine. It has the well-known stimulant and invigorating qualities with which the taking of tea is associated. Thus the brain is stimulated, the intellect becomes clear; there is removal of languor and fatigue with increased wakefulness and alertness. The following is by a Chinese writer, who lived over 1,000 years ago and he writes so well, and so much to the point, that we must not quarrel with him if he has omitted to give us the reverse aspect of the question.

It tempers the spirits, and harmonises the mind,  
Dispels lassitude, and relieves fatigue,  
Awakens thought, and prevents drowsiness,  
Lightens or refreshes the body, and clears the perceptive faculties.

We shall also forgive Cowper's strong prepossession in favour of tea when we call to mind the easy, comfortable picture which he describes:

And while the bubbling and loud hissing urn,  
Throws up a steamy column, and the cups  
That cheer but not inebriate, wait on each  
So let us welcome peaceful evening in.

I suppose that this verse has been as much quoted as anything in our language, and the homely picture of the evening meal has done much to wean the English people from stronger drinks.

The following article from the *Lancet* of 1863 presents all the arguments, and very important arguments they are and very well stated which can be placed to the credit of tea-drinking:—

“It has a strange influence over mood—a strange power of changing the look of things, and changing it for the better: so that

we can believe and hope, and do under the influence of tea, what we should otherwise give up in discouragement and despair,—feelings under the influence of which tissues wear rapidly. In the language of the poor, who in London we are told spend one-eighth of their income in buying tea, it produces a feeling of comfort. Neither the philosopher nor the philanthropist will despise this property of tea, this power of conferring comfort, or removing *ennui*, of promoting those happier feelings of our nature under which we can do most and bear most. There is no denying the considerable dependence of our moods and frames upon substances; and as moods are as important as muscles, as they affect as largely a man's ability for the great ends of life, we cannot regard the cheapening of such substances, when devoid of noxious qualities, as other than a most important benefit to the poor."

This feeling of comfort, this power of changing the aspect of affairs, of appealing to the happier side of our nature, in other words of putting us at our best, is undoubtedly due to the alkaloid of tea. Since I have been interested in the subject I have conversed with a number of friends, and many have told me that the best time of day to do any writing or intellectual work is after a cup of tea in the afternoon, and I must confess to feeling more myself at this time than at any other; but, on the other hand if no afternoon tea is taken, this period of the day is when most people feel fagged and tired and incapable of mental exertion. This shews the great influence exercised by tea over our moods and feelings; and if tea is taken in moderation this property may be of great help and a mental stimulus to us in our daily vocation.

*Tannin*.—The other important constituent of tea, viz.: tannin is present to the extent of 10 or 20 per cent. and it is this substance to which most of the injurious effects of tea have been attributed. In excess tannin tends to depress the action of the digestive fluids and ferments. It interferes with the normal activity of secretion by constricting the blood vessels and diminishing the circulation, and lastly it tends to combine with the nitrogenous principles of the food rendering them insoluble and incapable of digestion. The tendency therefore of this substance is greatly to impare digestion and it gives rise to palpitation of the heart, headache, flatulence, loss of appetite, constipation and other symptoms so well-known at the out-patient departments of our general hospitals; on inquiry it is often found that the patient is accustomed to drink large quantities of tea, which has stood for long periods and consequently extracted excessive amounts of tannin.

In addition to the alkaloid and tannin the older writers asserted that tea contained a volatile oil to the extent of 0·6 to 1 per cent., and many of the qualities and deleterious effects of tea have been traced to the presence of this substance. The latest experiments, however throw some doubts on these early results. Thus in the report of Schimmel & Co. for April, 1897, it is stated (p. 39) that "in former years we endeavoured on several occasions to distil various kinds of tea in order to introduce tea oil . . . . we have, however, in no case succeeded in obtaining more than mere traces of oil," and they conclude that in the hands of the early experimenters the oil found on distillation was due to the artificial flavouring of tea which was common at that time. Schimmel & Co. in their Report for April, 1898 (p. 50) refer to a report of the Botanical Gardens in Buitenzorg for 1896. It appears that experiments were made on a large scale, thus 2500 kilograms of freshly fermented tea leaves were submitted to steam distillation and 130 cubic centimetres or 0·0052 per cent. of oil was obtained.\* It must be remembered that this oil was only found in freshly fermented leaves and from the minute quantity I think we may conclude that tea oil if present has little or no connection with the qualities and attributes of tea, or the deleterious effects to which it may give rise.

A word or two with reference to the adulteration of tea. In former times a good many samples and especially of green tea were faced; this consisted in the addition of some colouring matter as Prussian blue, turmeric, or indigo; and sometimes black tea was faced with graphite. Another practice formerly prevalent was the addition of various leaves having a resemblance to tea leaves; and then there was the use of exhausted or spent leaves. All these forms of adulteration are now happily very seldom practiced. To shew the extreme rarity of tea adulteration in this country, in the 17 years from 1887 to 1903, 7595 samples were purchased under the Food and Drugs Acts and of these only 23 were found to be adulterated. These figures include 15 cases in 1898, and according to the report of the Local Government Board for this year many were of the description known as caper tea. This is one of the China varieties and consists of small granular masses made up by the aid of gum and starch, and this lends itself to the addition of sand and stones as actually happened in the cases in question. I think that with this exception of mineral matter, tea adulteration in this country may now be said to be practically non-existent.

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\* The oil was found to contain small quantities of methyl salicylate or oil of wintergreen.

We have glanced through the general effects of the important constituents of tea. I now propose to consider the amount of harm which can be justly attributed to this popular article of daily consumption.

The opposition to tea on the ground of injury to health is almost as old as the introduction of tea itself. One of the earliest objectors was Dr. Simon Pauli,\* the Physician to the King of Denmark, in a commentary he wrote on the abuse of tobacco and tea. He objected on the ground that "tea is moderately heating, bitter, drying and astringent." He felt it incumbent on him to warn Europeans against the abuse of tea, especially as the herb he said by no means answered the encomiums bestowed upon it by the Chinese and Japanese. "I wish all persons especially such as are old would obstinately reject *tea*, which so dries the bodies of the *Chinese* that they can hardly spit." Pauli was also a strong opponent of Coffee and alleged that it produced "sterility."

Another powerful writer on the subject was Dr. Cohausen a learned and ingenious German physician. The works of this author were numerous and bore evidence of the vigour of his intellect and of his application to letters. His work entitled "Neothea," and published in 1716, was written to shew the folly of sending to China for tea, when we had so many herbs to hand, just as pleasant and far more healthy. His wit for which he was justly celebrated was not sufficiently powerful to render the use of tea unfashionable.

Boerhaave, the great Dutch physician, and follower of Hippocrates and Sydenham had an objection to tea, but not so much to the herb itself as to the practice of drinking of hot liquids. He refers to those persons who "weaken their bodies with perpetual drinking of aqueous liquors; such is the very bad custom which prevails amongst the Dutch, who indulge themselves in a sedentary life, and all day long use those Asiatic drinks made of the berries of coffee or leaves of tea."† He also attributed to these drinks certain nervous disorders. "I have seen a great many, so enervated by drinking too freely of those liquors (tea, coffee and the like) that they could hardly move their limbs, and likewise several who were seized with the apoplexy and palsy from that cause."‡

An early lay opponent of tea-drinking was John Wesley. He tells us that when he first went to Oxford with an exceedingly good constitution "he was somewhat surprised at certain symptoms of a paralytic disorder." His hand shook especially after breakfast, and he observed

\* *Commentarius de abusu tabaci americanorum veteri et Herbae Thee Asiaticorum in Europa novo* 1665.

† *Van Swieten's Commentaries*, xvii., 450.

‡ *Ibid*, x., 274, 275.

that if he gave up tea-drinking for two or three days, the shaking ceased. On inquiry he found that tea had the same effect on others, and particularly on persons whose nerves were weak. This led him to lessen the quantity and to drink weaker tea, but still for about 26 years he was more or less subject to the same disorder. In 1746 he began to observe that a number of people in London were similarly affected, some suffering from the nerves with decay of bodily strength, and he asked them if they were hard drinkers, and learnt in reply that they drank nothing but a little tea, morning and evening. He came to the conclusion that they suffered from the effects of tea like he had himself. Wesley thought he should set an example and broke himself of a practice which had lasted for 27 years. The first three days he suffered from headache more or less all day long, and was half asleep from morning to night; on the third day his memory failed but the symptoms abated in the following day and his memory returned. He felt great benefit from the abstinence, and found that his hand was as steady at 45 as it had been at fifteen.

One of the most determined opponents of tea-drinking in the 18th century was Jonas Hanway, the eminent philanthropist and "father" of Sunday schools. His views may be gathered from the title of his work.\* Owing to the results of this beverage he said "men seem to have lost their stature and comeliness; and women their beauty . . . what Shakespeare ascribes to the concealment of love, is *in this age*, more frequently occasioned by the use of *tea*. . . . I am persuaded the inhabitants of this island will never increase in number nor enjoy a blooming health whilst they continue such an extravagant use of tea." Hanway's exaggerations succeeded in drawing Dr. Johnson into the controversy. The great man in a review of Hanway's work said "he is to expect little justice from the author of this extract, a hardened and shameless tea-drinker who has for twenty years diluted his meals with only the infusion of this fascinating plant, whose kettle has scarcely time to cool, who with tea amuses the evening, with tea solaces the midnights, and with tea welcomes the morning." †

We learn from Boswell that "no person ever enjoyed with more relish the infusion of that fragrant leaf than Johnson. The quantities which he drank of it at all hours were so great, that his nerves must have been uncommonly strong, not to have been extremely relaxed by such an intemperate use of it." Boswell says that Johnson assured him he never felt the least inconvenience from it. In a footnote to page 105 of Boswell's

\* "An Essay on Tea, considered as pernicious to health, obstructing industry, and impoverishing the nation," London 1757.

† THE LITERARY MAGAZINE, 1757, ii., 161.

"Life" we are informed that a Mr. Parker of Henley was in possession of a tea-pot which belonged to Dr. Johnson and held "above two quarts."

At the end of the eighteenth century Dr. Lettsom, a well-known authority on the subject, published a work on the "Natural History of the Tea Tree." He found that amongst the less hardy and robust complaints were ascribed to the drinking of tea "there are many who cannot bear to drink a single dish of tea without being immediately sick and disordered at the stomach, . . . . and that in irritable constitutions it speedily excited the nerves to such a degree as to give rise to uneasy sensations and bring on spasmodic affections." He also says "I know people of both sexes, who are constantly seized with great uneasiness, anxiety, and oppression as often as they take a single cup of tea." For children he thought it decidedly harmful "children and very young persons in general, should as much as possible be deterred from the use of this infusion. It weakens their stomach, impairs the digestive powers and favours the generation of many diseases." On the whole however, he was not altogether opposed to the practice in strong healthy vigorous adults," to such it is undoubtedly wholesome and equal at least if not preferable to any other kind of regale now in use." On another page we read that "if not drunk too hot, nor in too great quantities it is perhaps preferable to any other vegetable infusion we know."

Quite at the end of the eighteenth century, Dr. Buchan, who was something of a medical reformer, and had naturally observed the results of tea-drinking thought that the ill-effects proceeded rather from the imprudent use of it than from any bad qualities in the tea itself. In his "Domestic Medicine" (p. 74) he says, "good tea, taken in moderate quantity, not too strong, nor too hot, nor drank upon an empty stomach, will seldom do harm, but if it be bad, which is often the case or substituted in the room of solid food, it must have many ill effects." He observed that "females who live much on tea and other watery diet, generally become weak, and unable to digest solid food; hence proceed hysterics, and all their dreadful consequences."

In the early part of the nineteenth century we have the opinion of William Cobbett, a vigorous writer and acute observer of the habits of the time in which he lived. In his "Advice to young men" Cobbett remarks "Let me beseech you to resolve to free yourselves from the slavery of the *tea* and *coffee* and other *slop kettle*, if unhappily you have been bred up in such slavery. Experience has taught me that those slops are *injurious to health*. Until I left them off (having taken to them at the age of 26) even my habits of sobriety, moderate eating, early rising, even these were not, until I left off the slops, sufficient to give me that complete health which I have since had."

The most complete but painful description I have come across of the distressing symptoms occasionally associated with tea-drinking is given by Dr. James Henry\* who writes in 1830. He refers to the case of a gentleman who commenced the use of tea of ordinary strength at the age of 14. Shortly afterwards sleep became less sound, and he became nervous and easily agitated about matters of small consequence. Afterwards he suffered from uneasiness even while sleeping, also from nightmare and palpitation of the heart. His sleep was disturbed during the whole period of ten years; during this time he took three cups of tea in the morning and three cups in the evening. At the age of 24 or 25 he used tea more freely and his sleep became more and more disturbed. He sometimes took tea twice in the same evening. The suffering was very great; he did not fall asleep at night until two o'clock and the agitation of mind and body was indescribable. The pulsations of the heart were sometimes quick and faint, and sometimes so violent that he could not lie on his left side. Sometimes the pulsations became scarcely perceptible for several moments, at such times the patient felt as if he were dying and if he fell asleep he awoke with a violent start. He wished to sleep that he might avoid the distressing sensations which he felt while awake, but feared to do so lest his awakening should be accompanied by frightful agony. After a time the distressing sensations were so marked especially just before going to bed that "in the society of my family I felt myself so agitated without any apparent cause that I was unable either to speak or think deliberately, or even to remain in one position and have been obliged that I might not be thought insane to rise abruptly, hurry out of the house and take violent exercise in the open air." At 30 years of age he renounced tea and never suffered afterwards, "the very first night I slept soundly and I have never had any return either of sleeplessness or of starting or of the sensation of imminent death, unless on the rare occasions when I have returned to the use of tea." Dr. Henry argued from the above case that "tea and coffee act as a poison upon some persons" and on turning his attention to the subject he found that such cases were far from uncommon, and concluded that like alcohol tea may be indulged in for a series of years without apparent ill consequences, but that sooner or later it undermines the health, and renders life miserable. As with alcohol he recognises two stages. The first stage was characterised by agreeable sensations in the stomach, moderate perspiration, quickened pulse and increased vivacity of mind and body. In the second stage there was irregular pulse, sometimes rapid, sometimes slow and intermitting, with palpitation

\* "A letter to the Members of the Temperance Society" James Henry, M.D., Dublin, 1830.

and pains in the region of the heart—a vivacity of thought and action which is quite uncontrollable by the will, a painful insensibility to impressions of all kinds, twitchings of the muscles, disturbed sleep, frightful startings especially in the evening, irregular and sometimes cold perspiration, impaired appetite and defective circulation in the extremities. He concluded "that the immoderate use of tea and coffee produce a disease which bears a close resemblance to the *delirium tremens* of whisky drinkers, and which is almost identical with the diseased state induced by the excessive indulgence of opium."

We now come to the opinion of the more recent authorities and a few remarks are necessary concerning the symptoms liable to result from excessive tea-drinking. In the *Boston Medical and Surgical Journal* for September 10th, 1868, a writer Dr. Pratt explains the effects on himself of 12 grains of the alkaloid of tea. After two hours there was great physical restlessness, a very uneasy state of mind which has been described by Lehmann as "mental anguish." Soon after there was marked tremulousness of the hands and arms; the hand trembled so violently that it was impossible to write with any regularity. The mind was excessively uncomfortable and anxious which admitted not of the slightest rest; it was in a state of most active and persistent thinking in spite of all attempts at forgetfulness. The severe symptoms lasted about two hours. Dr. Pratt spoke to one of the most prominent New England lady writers. She had tried green tea when pressed to do a large amount of writing in a short time. Some time after taking a large quantity of tea she felt as "if there was nothing left but her head which furnished rapidly language or ideas of the best quality, and in goodly quantity all night long." The next day there was headache and more or less prostration.

An important article on the "toxic effects of tea" was contributed by Dr. Morton\* in 1879. He said that the bad effects of tea tasting were known and recognised by the tea tasters themselves and that few could carry on the business for many years without breaking down. The immediate effects of immoderate doses were increased rapidity of pulse, increased respiration, agreeable exhilaration of mind and body, a feeling of contentment and placidity, and an increase of intellectual and physical vigour with no noticeable reaction. The immediate effects of an excessive dose, were a rapid elevation of the pulse and marked increase of respiration; there was no period of exhilaration, but immediate and severe headache, dimness of vision, ringing in the ears, and dulness and confusion of ideas. Following this a severe reaction with exhaustion of mind and body,

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\* "Medical Record," New York, 1879, xvi., 43.

tremulousness, nervousness and dread of impending harm. The effects of continued doses were—continuance of tremulousness, extreme susceptibility to outside impressions, constipation and diminution of urine.

Dr. Morton concluded that tea—like other potent drugs—had its proper and improper uses, in moderation it was a mild and pleasant stimulant followed by no harmful reaction but that continued and immoderate use led to serious symptoms including headache, giddiness, ringing in the ears, tremulousness, nervousness, exhaustion of mind and body, disinclination to mental and physical exertion, increased and irregular action of the heart and also dyspepsia.

Dr. Bullard\* of Boston made inquiry into the subject of poisoning from excessive tea drinking and found that the prominent symptoms were loss of appetite, dyspepsia, palpitation of the heart, headache, nervousness and various forms of functional nervous symptoms of an hysterical or neuralgic character; he found that usually speaking five cups of tea a day on an average were required to produce symptoms of tea poisoning.

A more recent investigator Dr. Wood† found in his practice at the Brooklyn Central Dispensary that of 1000 consecutive cases applying for general treatment, 100 or 10 per cent. were found to be “liberal indulgers in tea,” and suffering from its deleterious effects; of those 100 patients:—

45	complained of headache.
20	“ persistent giddiness.
20	“ despondency.
19	“ indigestion.
19	“ palpitation of the heart.
15	“ sleeplessness.

Dr. Wood found that when tea had been used for a considerable period in excess, the symptoms were giddiness, mental confusion, palpitation of the heart, restlessness, sleeplessness, hallucinations, nightmare, nausea, neuralgia, with prostration and anxiety. In three of Dr. Wood's cases there was a tendency to suicide.

Mr. Jonathan Hutchinson, a great authority thinks that it is only the abuse of tea which is attended with serious consequences. “For my own part I have not the least hesitation in recording the conviction that the development of the tea trade has been in the past and will be in the future a most important aid to the progress of civilisation. Nor do I

\* “The Boston Medical and Surgical Journal,” 1886, cxiv., 314.

† “Medical News,” 1894, lxv., 486.

believe that it will be attended by any serious drawbacks.”\* But he sounds a note of caution when he says “there can be no doubt whatever that the injudicious use of tea may produce not only alarming attacks of disturbance of the heart, but seriously impair the digestion, and enfeeble the nervous system.”

Sir Andrew Clark, who gave much consideration to the subject, in a lecture delivered at the London Hospital said, “I may remark incidentally that it has always been a matter of surprise to me how it is that we English people do not suffer more than we do from our indulgence in tea, especially tea prepared as it usually is, and taken after a prolonged fast early in the morning. It is a great and powerful disturber of the nervous system, and no one who has any regard for his or her nervous system would take it in that way. Its immediate effect may be all that can be desired. It relieves the *malaise* which is in itself a sign of warning, and it thus enables the consumer to disregard it. Beware gentlemen, of thus sitting on a safety-valve. Nature provides a warning in most cases of impending disaster, and if you wilfully disregard or stifle them, you do so at your peril. This pernicious habit of taking strong tea after a night’s fast, repeated day after day, week after week, year after year, leaves its stamp on the nervous organism of the individual, and this stamp is handed down, in part at any rate, to the generation that follows.”†

Sir Lauder Brunton‡ who has also given much study to the question made some remarks in his Lettsomian Lectures on the “Disorders of Digestion.” He said that tea was very apt to cause a feeling of acidity and flatulence. Sometimes the acidity comes on so soon after the tea taken that it is difficult to assign any other cause for it than an alteration in sensibility of the mucous membrane of the stomach or oesophagus. The effect of tannin he said was to interfere very considerably with the digestion of fresh meat, and there were many people in whom tea taken along with fresh meat will upset the digestion. It did not interfere with the digestion of dried meat such as ham or tongue. the fibres of these have already become shrunk or toughened in the process of curing. He thought that tea at breakfast was not so apt to cause indigestion, but that tea in the afternoon two or three hours after lunch would sometimes bring on acidity almost immediately. A part of the mischief wrought by tea in the lower classes was due to allowing it to infuse for a long time so that a large quantity of tannin was extracted.

\* Archives of Surgery, 1892, iii., 366.

† “Medical Press and Circular,” 1894, i., 188.

‡ “British Medical Journal,” 1885, i., 270.

Another reason was that the poor were accustomed to drink tea very hot. Heat was a powerful stimulant of the heart, and a cup of hot tea was therefore much more stimulating and refreshing than a cold one. The practice, however, of sipping the tea almost boiling was apt to bring on a condition of gastric catarrh. Sir B. W. Richardson was probably more opposed to the practice of tea-drinking than any of our leading modern physicians and as one of the most distinguished medical reformers of recent times his opinion is entitled to carry much weight.

“The common beverage tea,” he says, “is often a cause of serious derangement of health, if not of actual disease. The symptoms of disturbance occur when even the best kind of tea is taken in excess, and almost inevitably from the mixture called ‘green tea’ when that is taken even in moderate quantity. . . . Tea first quickens, and then reduces the circulation which is the action of a stimulant. But tea does more than this; it contains tannin, and is therefore styptic or astringent in its action. From which circumstance it is apt in many persons to produce constipation, and interfere with the function of the liver. In some persons this astringent effect of tea is very bad. It gives rise to a continued indigestion, and what is called biliousness. The most important agent in tea, however, is the organic alkaloid, theine. The alkaloid exercises a special influence on the nervous system, which, when carried to a considerable extent, is temporarily at least if not permanently injurious. At first the alkaloid seems to excite the nervous system, to produce a pleasant sensation and to keep the mind agreeably enlivened and active. The effect is followed by depression, sinking sensation at the stomach, flatulency, unsteadiness with feebleness of muscular power, and not infrequently a lowness of spirits, amounting almost to hypochondriacal despondency. Poor people meet the craving for natural food by taking large quantities of tea. A strong craving for it is engendered which leads to the taking of tea at almost every meal, greatly to the injury of health. Poor women in the factory and cotton districts become actual sufferers from this cause. They are rendered anæmic, nervous, hysterical, and physically feeble. In the better classes of society similar if not such severe injury is effected by tea in those who indulge in it many times a day, and especially in those who indulge in what is called afternoon tea. . . . The afternoon tea or drum causes dyspepsia, flatulency, nervous depression and low spirits, for relieving which not a few persons have recourse to alcoholic stimulation. . . . tea taken late in the evening, except immediately after a moderate meal, interferes with the sleep of most persons by causing indigestion, with flatulency, and sense of oppression. Some are kept awake entirely by the action of the tea on the

nervous system; others get off to sleep, but are troubled with dreams, restlessness, and muscular startings. In a few incubus or nightmare is a painful symptom induced by tea." In old people however, Sir Benjamin Richardson had not noticed such serious results "as persons advance in life the bad effects of tea sometimes pass away or are greatly modified." But for the generality of people Sir Benjamin certainly felt very strongly about the matter for elsewhere he says "it causes in a large number of persons a long and severe and even painful sadness, there are many who never know a day of felicity owing to this one destroying cause."\*

Having generally reviewed the question of injury to health I now come to our own experiments. I first made inquiry into the strength of tea, as commonly consumed, and found that the usual quantity of black tea added was about eight grammes to the 600 cubic centimetres of boiling water. I next approached two well-known firms who kindly supplied me with samples of pure unmixed Indian, Ceylon and China teas.

Eight grammes of each sample were weighed out, and were then infused in a tea-pot for five minutes with 600 cubic centimetres of boiling distilled water. At the end of five minutes the infusion was poured off and analysed for the percentage of extract, alkaloid, and tannin, and the following tables show figures for the Indian, Ceylon and China teas respectively.

TABLE E.  
ANALYSIS OF INDIAN TEAS.

(Infusion of 8 grammes with 600 cc of boiling distilled water for 5 minutes.)

No.	Description and District.	Wholesale Price without duty per lb.	Per cent. Extract.	Per cent. Alkaloid.	Per cent. Tannin.	Proportion of tannin corresponding to 2·8 per cent. Alkaloid.
1	Orange Pekoe, Deamoo-lie, Assam	1/10	24·75	3·11	6·87	6·18
2	Broken Orange Pekoe, Powai, Assam	1/10	28·87	3·07	9·45	8·61
3	Orange Pekoe, Tara, Assam	2/6	26·62	3·32	7·55	6·36
4	Pekoe, <sup>ss</sup> Darjeeling...	1/4	21·75	1·86	5·42	8·16
5	Fannings Badulipar, Assam	9d.	30·37	3·30	10·46	8·87
6	Pekoe, Singlo, Assam	9d.	27·37	2·79	9·87	9·90
7	Pekoe, Rungamuttee, Sylhet	7d.	23·25	2·70	5·35	5·55

\* Sanitary Record 1883, v, 199.

No.	Description and District.	Wholesale Price without duty per lb.	Proportion of Tannin			
			Per cent. Extract.	Per cent. Alkaloid.	Per cent. Tannin.	corresponding to 2·8 per cent Alkaloid
8	Pekoe, Assam ...	6 $\frac{3}{4}$ d.	27·90	2·86	7·26	7·11
9	Broken Orange Pekoe, Assam	1/-	30·60	3·60	7·90	6·14
10	Broken Orange Pekoe, Assam	1/9 $\frac{1}{2}$	25·90	2·62	8·92	9·53
11	Broken Orange Pekoe, Sylhet	7 $\frac{3}{4}$ d.	29·10	3·20	7·34	6·42
12	Orange Pekoe, Assam	7 $\frac{1}{2}$ d.	27·90	2·61	8·72	9·35
13	Pekoe, Sylhet ...	5 $\frac{1}{4}$ d.	24·18	2·70	6·40	6·64
14	Broken Pekoe, Darjeeling	10d.	23·20	2·41	7·15	8·31
15	Pekoe, Darjeeling ...	6 $\frac{1}{2}$ d.	21·92	2·21	5·72	7·25
16	Pekoe, Dooars ...	6d.	25·08	2·92	7·20	6·90
17	Broken Pekoe, Dooars	7d.	25·65	3·14	6·52	5·81
18	Orange Pekoe, Caehar	6 $\frac{1}{2}$ d.	25·53	2·62	5·70	6·09

TABLE F.  
ANALYSIS OF CEYLON TEAS.

Infusion of 8 grammes with 600 cc of boiling distilled water for 5 minutes.)

1	Orange Pekoe, Great Western, Unware Eliya District.	9d.	25·50	2·53	6·98	7·72
2	Broken Orange Pekoe, Concordia, Unware Eliya District.	1/3	28·61	2·64	10·10	10·71
3	Broken Pekoe, Pedro Unware Eliya District.	1/0	27·90	2·49	7·92	8·90
4	Pekoe ... ...	7 $\frac{3}{4}$ d.	26·92	2·58	8·65	9·39
5	Pekoe ... ...	5d.	22·68	2·86	5·82	5·69
6	Pekoe ... ...	6 $\frac{3}{4}$ d.	24·70	2·48	7·09	8·00
7	Broken Orange Pekoe	7 $\frac{1}{2}$ d.	25·68	2·63	7·39	7·86
8	Broken Pekoe ...	9d.	26·50	2·77	7·91	7·99
9	Broken Pekoe ...	6d.	24·41	2·98	6·46	6·07
10	Broken Pekoe ...	6 $\frac{3}{4}$ d.	25·01	2·67	8·39	8·80
11	Broken Orange Pekoe	11 $\frac{3}{4}$ d.	28·80	2·94	10·66	10·15
12	Orange Pekoe ...	7 $\frac{3}{4}$ d.	25·83	2·55	6·86	7·53

TABLE G.  
ANALYSIS OF CHINA TEAS.

(Infusion of 8 grammes with 600 cc of boiling distilled water for 5 minutes.)

No.	Description and District.	Wholesale Price without duty per lb.	Per cent. Extract.	Per cent. Alkaloid.	Per cent. Tannin.	Proportion of Tannin corresponding to 2·8 per cent. Alkaloid.
1	Fine Moning, Hankow	1/5	18·80	2·59	3·48	3·76
2	Oolong, Formosa	1/1	24·00	2·46	8·76	9·97
3	Souchong	...	18·30	2·60	2·44	2·63
4	Moning	...	20·43	2·23	2·96	3·71
5	Scented Orange Pekoe Canton	1/2	23·81	2·68	7·70	8·04
6	Gunpowder, Green Tea	1/4	29·47	2·55	9·54	10·47
7	Caper, Green Tea	10 $\frac{3}{4}$ d.	21·45	1·87	9·08	13·59
8	Oolong	...	10d.	23·62	2·47	8·80
9	Hyson, Green Tea	...	1/4	26·81	2·32	9·62
10	Pakling	...	5 $\frac{1}{4}$ d.	18·77	1·81	3·19
11	Pekoe Souchong, Lapsang	1/5	19·31	2·36	2·33	2·76
12	Panyang	...	4 $\frac{1}{2}$ d.	21·00	1·93	4·71
13	New make	...	8 $\frac{1}{2}$ d.	21·78	3·40	6·42
						5·28

The last column in the above tables or the proportional amount of tannin is arrived at in the following manner. I first calculate the average amount of alkaloid in tea as consumed on a basis of the above figures. Thus the average amount of alkaloid in Indian teas as seen in Table H calculates out to 2·84 per cent. This is multiplied by the proportion of Indian teas on the market, viz. about 60 per cent. in the same way the average Ceylon alkaloid 2·68 is multiplied by 30, and the China average 2·40 multiplied by 6. If we add these products together and divide by  $60 + 30 + 6 = 96$  this will give us the average percentage of alkaloid in tea as consumed and this amounts to about 2·8 per cent. The last column in Tables E, F and G, gives the proportion of tannin corresponding to 2·8 per cent. alkaloid; that is to say the tannin in each case is multiplied by 2·8 and divided by the amount of alkaloid actually present. This figure which represents the proportional amount of tannin present renders the comparison of the different teas possible so far as the astringent action is concerned.

The following table summarises the results of analyses of the three classes of teas:—

TABLE H.

Class of Teas.	Number of Analyses.	Per cent. Extract.	Per cent. Alkaloid.	Per cent. Tannin.	Proportion of Tannin corresponding to 2·8 per cent. Alkaloid.
Indian Teas ...	... 18	26·11	2·84	7·43	7·32
Ceylon Teas ...	... 12	26·04	2·68	7·85	8·20
China Teas ...	... 13	22·12	2·40	6·08	7·09

Thus the Ceylon teas under the conditions of experiment part with slightly more tannin than the India or China teas. It will be noticed that the proportional tannin figures for the India and China teas are not very different, although some of the individual China teas give out less tannin than any of the India or Ceylon samples. It is possible that the China average is rendered rather high by an undue proportion of green tea which of course shows excess of tannin. The question will naturally be asked whether as a nation we do not drink too much tea, and there is a very simple means of solving the problem. As shown in table A the average consumption per head per annum in the United Kingdom is 6·1 pounds, or 117 grains of tea per diem. The average percentage of alkaloid in tea, as consumed, I calculate to be 2·8 per cent., and of tannin 7·5 per cent. This will mean that each person will take a daily dose of 3·28 grains of alkaloid and 8·8 grains of tannin. According to the last Census 3,716,708 out of 32,527,843, or 10 per cent. of the population of England and Wales, are under five years of age; these might almost be neglected as far as tea-drinking is concerned, so that we must add one-tenth to the average daily dose of the alkaloid and tannin, which will come to 3·6 grains of alkaloid, and 9·7 grains of tannin. The dose of caffeine according to the British Pharmacopoeia is from one to five grains and of tannin from two to five grains. And hence on an average each person in the United Kingdom is constantly day by day consuming half as much alkaloid, and nearly as much tannin as would be permissible to be taken occasionally as a drug. Therefore I have no hesitation whatever in saying that we drink far too much tea, and the question has been raised in Ireland whether the excessive drinking of strongly infused tea has not had something to do with the increasing prevalence of insanity in that country. Thus in the Forty-third Annual Report of the Inspectors of Lunatics, Ireland (1894), the Inspectors dwell on the ill effects of decocted or over infused tea on persons who make it a staple article of dietary, thus leading to the production of dyspepsia, which in its turn tends to states of mental depression highly favourable to the production of the various forms of neurotic disturbance.

Thus Dr. William Graham of the Armagh District Asylum refers to the recent changes of dietary having an unquestioned influence on the increasing prevalence of insanity. He refers to the use of Indian tea as a beverage between meals. "The tea," he says, "is stewed, not infused, as a consequence the use of increased amount of nervine food leads to a peculiar form of dyspepsia, which in its turn leads to a general debility of the nervous system. This change is therefore to be considered as a factor in the increase of insanity." Dr. G. W. Hatchell, the Resident Medical Superintendent of the Castlebar District Asylum, stated that "amongst the female inmates, I believe many cases of insanity may be attributable to the frequent consumption of decoction of tea, taken generally without food and for lengthened periods."

Again Dr. Thomas Drapes of the Enniscorthy Asylum, said "there is not much evidence of the excessive use of this beverage (tea) being directly provocative of insanity, but I think there is very little doubt that its too liberal use excites or aggravates a predisposition to neurotic disorders, including insanity, making the nervous system more vulnerable in regard to such maladies, by the increased excitability of the nervous system which tea undoubtedly produces. A neurotic organisation may also be transmitted to their progeny by parents who drink tea to excess."

Lastly, Dr. E. E. Moore of the Letterkenny Asylum, said "As to the consumption of tea, it seems to be enormous and increasing rapidly all over the country. I am informed that it is taken by young and old alike, and even by babes in the cradle. It is drunk as often as it can be got, at every meal and between meals, often six times a day, and especially by females and usually without milk, and often without food. I may safely say that it is never taken as an infusion, but is generally stewed for hours, the old leaves being left in the teapot and fresh added as required. In some places I am told the way the tea is made is by putting the leaves down in a saucepan of cold water, and then boiling it until the decoction is black enough to be palateable. . . . I can speak from practical experience of the terrible effects of this system of tea drinking both among the sane and insane. It gives rise to a severe form of chronic dyspepsia, and if persisted in to dyspepsia of an incurable and painful form. The result of all this is that the health of the people all through the county is deteriorating more than most people imagine. In fact the people are starving themselves on tea, and the weaker they become the more they rush to the teapot for the fillip the draught therefrom may give them for the moment. This tea-drinking is becoming a curse, and the people are developing a craving for tea, just as great as that which a drunkard has for alcohol, or a drug-taker for his own particular drug. There is no

manner of doubt but that the condition of bodily health affects the mental health of every man, woman and child, and if the starved stomach becomes a prey to chronic dyspepsia the chances are very great that the mind will, before long, be materially affected especially where there is a predisposition to insanity of an hereditary type." With these important testimonies from responsible officials, it is difficult to resist the conclusion that the abuse of tea drinking has acted as a factor in the increased prevalence of insanity.

As a general conclusion from my investigations I have no doubt that in the first place we drink too much tea ; this is shewn by a simple calculation from the average annual amount imported for consumption. Of course children of tender years should obviously be given no strong stimulants (such as tea or coffee) and adults would be acting wisely to very much limit the amount taken. With regard to the best method of preparation it should be infused, (neither stewed or decocted) and certainly for no longer period than five minutes, and a good plan is to pour the tea off at the end of this time into another vessel so as to save further exhaustion from the leaves. In reference to the variety of tea best to use, although it is not certain that the average of China teas contains less tannin than Indian teas, there is no doubt that individual samples of China tea can be procured comparatively free from this deleterious substance.

With a view of discovering the constituent parts of the tea popularly consumed, I procured samples from each of the four leading Companies, which probably amongst them, supply nine-tenths of the tea drunk in London Restaurants. The infusion was made in exactly the same way as described above and the analyses came out as follows :—

TABLE I.  
RESTAURANT TEAS.

(Infusion of 8 grammes with 600 cc. of boiling distilled water for 5 min.)

No.	Description and District.	Retail Price per lb.	Per cent. Extract.	Per cent. Alkaloid.	Per cent. Tannin.	corresponding to 2·8 per cent. Alkaloid.
1	"China" Tea ...	2/2	20·20	2·51	4·85	5·41
2	Ordinary Black Tea...	2/2	25·60	2·04	9·03	12·39
3	"China" Tea ...	2/0	20·06	2·15	3·02	3·93
4	Ordinary Black Tea...	2/0	27·90	2·69	9·74	10·13
5	"Russian" Tea ...	2/6	23·50	2·30	5·36	6·52
6	Ordinary Black Tea...	2/8	24·60	3·02	6·03	5·59
7	"China" Tea ...	2/4	24·50	2·22	5·85	7·37
8	Ordinary Black Tea...	2/2	28·31	2·72	8·44	8·69

It will be observed that the China teas exhibited a fairly low proportion of tannin. The numbers for ordinary black tea in two of the Companies' samples were, however, considerable. This points to the advisability of teas being analysed before being placed upon the market, and this is a reform much needed in the interest of the public. The tea should be examined for the amount of the alkaloid, and also the tannin extracted by infusion, and the price based on the proportion of the essential ingredient, viz: the alkaloid and if it is desired to place the matter on any sort of scientific basis, the public should in each case be informed of the weight of tea required to be used with boiling water (this being regulated by the quantity of the alkaloid), and at the same time an indication should be given of the proportion of tannin liable to be extracted in a standard infusion. My general recommendations from the foregoing experiments, and also from the experience of the various authorities are that if tea is to be no longer a source of injury to health we should drink much less, and infuse for a briefer period. The dealers also should more frequently submit samples for analysis as in the case of other foods and drinks; thus when we *do* drink tea we should be in a position to avoid those varieties which are especially harmful; and there is no doubt that if these recommendations are carried out we shall be saved from a number of distressing complaints which, although very rarely fatal, have in the past occasioned much ill health, and have been a source of discomfort and misery both of mind and body to thousands who might otherwise have enjoyed the comfort to be derived from a carefully regulated use of the infusion of the leaves of the tea plant.